

THE INVENTION CLAIMED IS:

1. A Remote Test Unit (RTU), comprising:
a logic circuitry adapted to emulate a central modem for testing customer premises
equipment containing a remote modem; and
5 a modem central/remote test head connected to the logic circuitry for connecting the
logic circuitry to the remote modem.
2. The Remote Test Unit of claim 1 wherein:
the logic circuitry is further adapted to emulate a remote modem for testing central
offices equipment including a multiplexer containing a central modem; and
the modem central/remote test head connects the logic circuitry to the central modem.
- 10 3. The Remote Test Unit of claim 1 further including:
a copper loop testing (CLT) test head connected to the logic circuitry for connecting
the logic circuitry to customer premises equipment; and wherein
the logic circuitry is further adapted to perform copper loop testing on a first
connection between the logic circuitry and the customer premises equipment.
- 15 4. The Remote Test Unit of claim 3 further including:
a plurality of test ports; and
an internal matrix connected to the plurality of test ports for selectively connecting the
modem central/remote test head and the CLT test head to the plurality of test
20 ports.
5. The Remote Test Unit of claim 4 wherein:
each of the plurality of test ports is connected to the multiplexer.
6. The Remote Test Unit of claim 4 wherein:
the modem central/remote test head is connected to a first one of the plurality of test
25 ports and the CLT test head is connected to a second one of the plurality of
test ports, the first one of the plurality of test ports being shorted to the second
one of the plurality of test ports.
7. The Remote Test Unit of claim 1 wherein:
the logic circuitry is further adapted to emulate a concentrator connected to the
30 multiplexer.

8. The Remote Test Unit of claim 7 wherein:
the logic circuitry is further adapted to emulate a router connected to the concentrator.
9. A Remote Test Unit (RTU), comprising:
a logic circuitry adapted to emulate a central Digital Subscriber Line Modem (DSL-
C) for testing customer premises equipment containing a remote Digital
Subscriber Line Modem (DSL-R); and
a Digital Subscriber Line Modem Central/Remote (DSL-C/R) test head connected
to the logic circuitry for connecting the logic circuitry to the DSL-R.
10. The Remote Test Unit of claim 9 wherein:
the logic circuitry is further adapted to emulate a DSL-R for testing central offices
equipment including a Digital Subscriber Line Access Multiplexer (DSLAM)
containing a DSL-C; and
the DSL-C/R test head connects the logic circuitry to the DSL-C.
11. The Remote Test Unit of claim 9 further including:
a copper loop testing (CLT) test head connected to the logic circuitry for connecting
the logic circuitry to customer premises equipment; and wherein
the logic circuitry is further adapted to perform copper loop testing on a first
connection between the logic circuitry and the customer premises equipment.
12. The Remote Test Unit of claim 11 further including:
a plurality of test ports; and
an internal matrix connected to the plurality of test ports for selectively connecting the
DSL-C/R test head and the CLT test head to the plurality of test ports.
13. The Remote Test Unit of claim 12 wherein:
each of the plurality of test ports is connected to the DSLAM.
14. The Remote Test Unit of claim 12 wherein:
the DSL-C/R test head is connected to a first one of the plurality of test ports and
the CLT test head is connected to a second one of the plurality of test ports,
the first one of the plurality of test ports being shorted to the second one of the
plurality of test ports.
15. The Remote Test Unit of claim 9 wherein:
the logic circuitry is further adapted to emulate a concentrator connected to the
DSLAM.

16. The Remote Test Unit of claim 15 wherein:
the logic circuitry is further adapted to emulate a router connected to the concentrator.
17. The Remote Test Unit of claim 16 wherein:
the logic circuitry is further adapted to emulate an Internet service provider (ISP)
connected to the router.
18. The Remote Test Unit of claim 16 wherein:
the logic circuitry is further adapted to emulate a web site connected to the ISP over
an Internet.
19. The Remote Test Unit of claim 9 wherein:
the logic circuitry is further adapted to test an ISO/OSI layer connected to the
DSLAM, the ISO/OSI layer is selected from the group consisting of a network
layer, a transport layer, a session layer, a presentation layer and an application
layer.
20. A Remote Test Unit (RTU), comprising:
a logic circuitry adapted to emulate
a central Digital Subscriber Line Modem (DSLAM-C) for testing customer
premises equipment containing a remote Digital Subscriber Line
Modem (DSLAM-R), and
a DSLAM-R for testing central offices equipment including a Digital Subscriber
Line Access Multiplexer (DSLAM) containing a DSLAM-C;
a Digital Subscriber Line Modem Central/Remote (DSLAM-C/R) test head connected
to the logic circuitry for connecting the logic circuitry to the DSLAM-R and for
connecting the logic circuitry to the DSLAM-C;
a copper loop testing (CLT) test head connected to the logic circuitry for connecting
the logic circuitry to the customer premises equipment; and wherein:
the logic circuitry is further adapted to perform copper loop testing on
a first connection between the logic circuitry and the customer
premises equipment;
a plurality of test ports; and
an internal matrix connected to the plurality of test ports for selectively connecting the
DSLAM-C/R test head and the CLT test head to the plurality of test ports.

21. The Remote Test Unit of claim 20 wherein:

the logic circuitry is further adapted to emulate a device selected from the group consisting of: a concentrator connected to the DSLAM, a router connected to the concentrator, an internet service provider (ISP) connected to the router, and a web site connected to the ISP over an Internet.

22. The Remote Test Unit of claim 20 wherein:

the logic circuitry is further adapted to test an ISO/OSI layer connected to the DSLAM, the ISO/OSI layer is selected from the group consisting of a network layer, a transport layer, a session layer, a presentation layer and an application layer.

23. A network, comprising:

a plurality of customer premises equipment, each of the plurality of customer premises equipment containing a remote Digital Subscriber Line Modem (DSL-M-R);

central offices equipment including a Digital Subscriber Line Access Multiplexer (DSL-M-C) containing a central Digital Subscriber Line Modem (DSL-M-C);

a remote test unit (RTU), the RTU including:

a logic circuitry adapted to emulate the DSL-M-C for testing the DSL-M-R of the plurality of customer premises equipment, and

a Digital Subscriber Line Modem Central/Remote (DSL-M-C/R) test head connected to the logic circuitry for connecting the logic circuitry to the DSL-M-R; and

an access matrix adapted to selectively connect:

the plurality of customer premises equipment to the DSLAM,

the plurality of customer premises equipment to the RTU, and

the DSLAM to the RTU.

24. The network of claim 23 wherein:

the logic circuitry is further adapted to emulate the DSL-M-R for testing the DSL-M-C; and

the DSL-M-C/R test head connects the logic circuitry to the DSL-M-C.

25. The network of claim 24, wherein the RTU further includes:
a copper loop testing (CLT) test head connected to the logic circuitry for connecting
the logic circuitry to customer premises equipment; and wherein
the logic circuitry is further adapted to perform copper loop testing on a first
connection between the logic circuitry and the customer premises equipment.
26. The network of claim 25, wherein the RTU further includes:
a plurality of test ports; and
an internal matrix connected to the plurality of test ports for selectively connecting the
DSLAM-C/R test head and the CLT test head to the plurality of test ports.
27. The network of claim 26, wherein:
each of the plurality of test ports is connected to the DSLAM.
28. The network of claim 25, wherein:
the DSLAM-C/R test head is connected to a first one of the plurality of test ports and
the CLT test head is connected to a second one of the plurality of test ports,
the first one of the plurality of test ports being shorted to the second one of the
plurality of test ports.
29. The network of claim 28 further including:
a concentrator connected to the DSLAM for combining signals from the DSLAM into
combined signals; and wherein:
the logic circuitry is further adapted to emulate the concentrator.
30. The network of claim 23 further including:
a router connected to the concentrator for routing the combined signals from the
concentrator; and wherein:
the logic circuitry is further adapted to emulate the router.
31. The network of claim 23 further including:
an Internet service provider connected to the router for receiving the combined signals
and providing access to an Internet; and wherein:
the logic circuitry is further adapted to emulate the ISP.
32. The network of claim 23 further including:
a web site connected to the ISP over the Internet; and wherein
the logic circuitry is further adapted to emulate a web site connected to the ISP over
the Internet.

33. The network of claim 23 wherein:

the logic circuitry is further adapted to test an ISO/OSI layer connected to the DSLAM, the ISO/OSI layer is selected from the group consisting of a network layer, a transport layer, a session layer, a presentation layer and an application layer.

34. The network of claim 23 wherein:

the access matrix is further adapted to selectively connect:

one of the plurality of customer premises equipment to the RTU and block the one of plurality of customer premises equipment from the DSLAM; and

the DSLAM to the RTU and block the DSLAM from the plurality of customer premises equipment.

35. A network, comprising:

a plurality of customer premises equipment, each of the plurality of customer premises equipment containing a remote Digital Subscriber Line Modem (DSL-M-R);

central offices equipment including a Digital Subscriber Line Access Multiplexer (DSLAM) containing a central Digital Subscriber Line Modem (DSL-M-C);

a remote test unit (RTU), the RTU including:

a logic circuitry adapted to emulate:

the DSL-M-C for testing the DSL-M-R, and

the DSL-M-R for the DSL-M-C,

a Digital Subscriber Line Modem Central/Remote (DSL-M-C/R) test head connected to the logic circuitry for connecting the logic circuitry to the DSL-M-R and for connecting the logic circuitry to the DSL-M-C,

a copper loop testing (CLT) test head connected to the logic circuitry for connecting the logic circuitry to the customer premises equipment; and wherein:

the logic circuitry is further adapted to perform copper loop testing on a first connection between the logic circuitry and the customer premises equipment,

a plurality of test ports, and

an internal matrix connected to the plurality of test ports for selectively connecting the DSLM-C/R test head and the CLT test head to the plurality of test ports, and

an access matrix adapted to selectively connect:

the plurality of customer premises equipment to the DSLAM,
the plurality of customer premises equipment to the RTU, and
the DSLAM to the RTU.

36. The network of claim 35 further including:

a concentrator connected to the DSLAM for combining signals from the DSLAM into combined signals;

a router connected to the concentrator for routing the combined signals from the concentrator;

an Internet service provider connected to the router for receiving the combined signals and providing access to an Internet; and

a web site connected to the ISP over the Internet; and wherein:

the logic circuitry is further adapted to emulate the concentrator, the router, the ISP, and the web site.

37. The network of claim 35 wherein:

the logic circuitry is further adapted to test an ISO/OSI layer connected to the DSLAM, the ISO/OSI layer is selected from the group consisting of a network layer, a transport layer, a session layer, a presentation layer and an application layer.

38. The network of claim 35 wherein:

the access matrix is further adapted to selectively connect:

one of the plurality of customer premises equipment to the RTU and block the one of plurality of customer premises equipment from the DSLAM;
and

the DSLAM to the RTU and block the DSLAM from the plurality of customer premises equipment.

39. A method for testing a network, comprising:

emulating a central Digital Subscriber Line Modem (DSLAM-C);

connecting the emulated DSLAM-C to an access matrix for testing customer premises equipment containing a remote Digital Subscriber Line Modem (DSLAM-R).

40. The method of claim 39 further including:
emulating the DSLM-R; and
connecting the emulated DSLM-R to the access matrix for testing central offices
equipment including a Digital Subscriber Line Access Multiplexer (DSLAM)
containing the DSLM-C.
41. The method of claim 40 further including:
performing a copper loop testing (CLT) on a connection between the customer
premises equipment and the central offices equipment.
42. The method of claim 40 wherein:
the step of connecting the emulated DSLM-C to an access matrix further includes the
step of connecting the emulated DSLM-C to a first one of a plurality of test
ports; and
the step of connecting the emulated DSLM-R to an access matrix further includes the
step of connecting the emulated DSLM-R to the first one of the plurality of
test ports; and
the step of performing a CLT on a connection between the customer premises
equipment and the central offices equipment further including the step of
connecting the central offices equipment to a second one of the plurality of
test ports.
43. The method of claim 42 wherein:
each of the plurality of test ports is connected to the DSLAM.
44. The method of claim 42 wherein:
the first one of the plurality of test ports and the second one of the plurality of test
ports are shorted.
45. The method of claim 39 further including:
emulating a concentrator connected to the DSLAM.
46. The method of claim 45 further including:
emulating a router connected to the concentrator.
47. The method of claim 46 further including:
emulating an Internet service provider (ISP) connected to the router.
48. The method of claim 46 further including:
emulating a web site connected to the ISP over an Internet.

49. The method of claim 39 further including:

testing, using emulation, an ISO/OSI layer connected to the DSLAM, the ISO/OSI layer is selected from the group consisting of a network layer, a transport layer, a session layer, a presentation layer and an application layer.

50. The method of claim 40 wherein:

the step of connecting the emulated DSLM-C to an access matrix for testing the customer premises equipment blocks the customer premises equipment from the central offices equipment.

51. The method of claim 40 wherein:

the step of connecting the emulated DSLM-R to an access matrix for testing the central offices equipment blocks the central offices equipment from the customer premises equipment.

52. A method for testing a network, comprising:

emulating a central Digital Subscriber Line Modem (DSL-C);

connecting the emulated DSLM-C to an access matrix for testing customer premises equipment containing a remote Digital Subscriber Line Modem (DSL-R);
emulating the DSLM-R;

connecting the emulated DSLM-R to the access matrix for testing central offices equipment including a Digital Subscriber Line Access Multiplexer (DSLAM) containing the DSLM-C; and

performing a copper loop testing (CLT) on a connection between the customer premises equipment and the central offices equipment

53. The method of claim 52 wherein:

the step of connecting the emulated DSLM-C to an access matrix further includes the step of connecting the emulated DSLM-C to a first one of a plurality of test ports; and

the step of connecting the emulated DSLM-R to an access matrix further includes the step of connecting the emulated DSLM-R to a second one of the plurality of test ports; and

the step of performing a CLT on a connection between the customer premises equipment and the central offices equipment further including the step of connecting the central offices equipment to a third one of the plurality of test ports.

54. The method of claim 53 wherein:
the first one of the plurality of test ports, the second one of the plurality of test ports,
and the third plurality of test ports are shorted.
55. The method of claim 52 further including:
emulating a concentrator connected to the DSLAM.
56. The method of claim 55 further including:
emulating a router connected to the concentrator.
57. The method of claim 56 further including:
emulating an Internet service provider (ISP) connected to the router.
58. The method of claim 57 further including:
emulating a web site connected to the ISP over an Internet.
59. The method of claim 52 further including:
testing, using emulation, an ISO/OSI layer connected to the DSLAM, the ISO/OSI
layer is selected from the group consisting of a network layer, a transport
layer, a session layer, a presentation layer and an application layer.
60. The method of claim 52 wherein:
the step of connecting the emulated DSLM-C to an access matrix for testing the
customer premises equipment blocks the customer premises equipment from
the central offices equipment; and
the step of connecting the emulated DSLM-R to an access matrix for testing the
central offices equipment blocks the central offices equipment from the
customer premises equipment.